

Accelerator Systems Division Highlights for the Week Ending June 1, 2001

ASD/LBNL: Front End Systems

In fulfillment of a Project Milestone, the design of the SNS Front End has been completed on May 10, the date of the last design review for any Front-End subsystem.

Ion source #2 was successfully operated with a 'standard' inductive matcher and low-amplitude, cw 13.56-MHz RF power. This is the first step in the effort to finalize the choice of matcher type for the porcelain/copper antenna version.

RFQ Module #2 has been installed on the conditioning stand (replacing Module #1), and power conditioning activities have started. Module #4 has had all vane-modulations cut to precise shapes.

MEBT rebuncher cavity #1 has been completed and passed its acceptance test at the vendor's site in presence of two FES team members. The cavity is presently on its way to Berkeley and expected to arrive on June 4.

The Front-End Systems were graced by the presence of SNS managers K. Boudwin, S. Herron, and J. Hill, on May 24, and N. Holtkamp, on May 25, who were visiting to discuss project-management topics.

ASD/LANL: Warm Linac

This week we discovered that the cooling passages in all six of the CCL Hot Model segment end walls were blocked with excess braze material resulting from the brazing of the end cell. This was discovered when the end walls were being cleaned in preparation for the stack braze of the first segment. The cleaning process involves ultrasonic cleaning of the cooling passages using a detergent cleaning solution and then drying the cooling passages with dry nitrogen. The blockage was discovered during the drying process. Ultrasonic inspection revealed the location of the blockage and machining a slot into the blocked region and directly observing the excess braze material in the coolant passage confirmed this. The solution to the problem is to machine a new coolant channel into the end wall and then to E-beam weld a flush cover plate in place. The CAE files needed for machining the end walls and cover plate have been generated and are being transferred to the machine and E-beam welding shops. The machining is expected to be completed this week and the end walls will be E-beam welded early next week. One unexpected benefit of this solution is that fabrication of the end wall coolant passage should be more reliable and cost effective than the original brazing process. (WBS 1.1.2.2)

The prototype coupler hardware and control racks were shipped backed to Jlab this week. Our test stand was used to resume high-power qualification tests on the prototype SRF load. (WBS 1.4.1.1)

We have notified RATS personnel of impending delivery of 15-25 boxes of waveguide, 10 water loads, and insulation oil. (WBS 1.4.1.1)

In response to the recommendations voiced at last month's high-voltage converter modulator (HVCM) FDR last week, we are proceeding with full-voltage, high-repetition rate, low-current tests of the 140-kV HVCM. An 8-kW average power load resistor has been fabricated and is being installed. (WBS 1.4.1.2)

The FDR for the RF Control System for the SNS SRF Linac has been scheduled. It will be held in Los Alamos on August 1, 2001. (WBS 1.4.1.3)

We received the bids for the final machining of the DTL tanks. Two vendors submitted a no bid in part due to the aggressive schedule. We have modified the delivery schedule to meet the IPS requirements of Tank 3 and re-released the RFP for an additional week. The modifications to RFP allow the vendors more time to fabricate the DTL tanks while having a minor impact to the schedule. It will, however, require three trips to Germany for copper plating instead of two. (WBS 1.4.2.2)

We released the RFP for the Glidcop, which will be used to fabricate DTL drive iris hardware. (WBS 1.4.2.2)

We awarded the contract for the copper forging, which will be used to fabricate the DTL end walls. Delivery time is expected to be 7 weeks. (WBS 1.4.2.2)

In response to recommendations voiced at last month's DTL FDR, drawings for the PMQ drift tubes have been modified to incorporate a shoulder, which will prevent the pole pieces from moving in the longitudinal direction should the set screws in the housing become loose with time. We have also modified the manifold at the top of the drift tube to accommodate a fiducial for the laser tracker. All of the PMQs from Aster have been shipped and received at LANL. We now have 160 magnets ready for installation into the PMQ drift tubes. The procurement order for the BPM drift tubes went to procurement this week. We hope to have the order placed by July 1. The prototype EMD drift tube is expected to be finished by July 14 and we are planning to have the PR to procurement shortly thereafter. (WBS 1.4.2.3)

Lloyd Young, currently a member of the LANL SNS Physics Team, is one of two recipients of the 2001 Particle Accelerator Science and Technology Award from the IEEE Nuclear and Plasma Sciences Society. This award will be presented to Lloyd at a ceremony later this month at PAC01 in Chicago. Further information may be found at <http://hibp.ecse.rpi.edu/~connor/ieee/pastaward.html>.

ASD/JLAB: Cold Linac

Fabrication on the Warm Compressor Skids, Cold Compressors, and 4.5K Coldbox continues.

The clean room Stop Work is being changed to a cancellation.

The MB single cell cavity has been tested and the HOM performance was as expected.

The MB cavities #2-4 are in final welding. The He vessel is being attached to cavity #1. The calculations continue for stiffing the MB He vessels. The detailed test plan is complete.

The second pair of couplers is in customs.

The EP parts bid is being awarded. Work on the specification for the EP cabinet is complete.

The Cavity vendor 2nd phase bids were received and are being evaluated.

Cavity ends bids were received.

The remaining two of three PCR's for R&D to improve the HB performance from 27.5 to 35.0 MV/m in the horizontal cryostat have been submitted and have a drop-dead date of 1-Jul-02 (LI 01-017 & 018)

PCR LI 01-058 for JLab's increased cost of testing the first 5 pair at LANL is in draft form, \$275K (FY99\$); this brings the total work-a-round cost of testing the first 5 pair to about \$600K. Together with the fact that for the most optimistic scenario for the 1MW RF system we will need to test another 10 pair at LANL, this leads to a totally unacceptable cost. Therefore we are discussing with LANL the concept of composite crews in order to reduce inefficiency and travel costs.

The last remaining major procurement should be released next week. We could productively use an additional \$3M of BA if the first \$1M became available on 1-Jul-01. Preparations for supplemental procurements are proceeding. The first of these supplemental RFP's (CM #14 – Production FPC) was released.

In addition we will have \$8M of phased contracts that can be forward funded.

In the fall of 1999 as part of the MOU discussion, it was agreed that SNS would provide a skidded RF system for the JLab testing of CM's and fundamental power couplers; the original target date was Dec-00 in order to support FPC testing. It is needed in the 2ndQ FY02 to test the Prototype CM at full power. If the PCR's are approved now, the best we can do is deliver a standard SNS system after we start full 1 CM per month production. (This is also a 6-month slip in the Milestone #2-30.) This system is a key element not only for conditioning and acceptance testing

but also is required to raise the High Beta Gradient from 27.5 to 35.0 MV/m. LANL requires a minimum funding of 20% of LI 01-035 to get started planning, and JLab requires a minimum funding of 25% of LI 00-068 in order to procure long lead items (vacuum circuit breakers, heat exchangers, pumps, pipe, and valves).

In addition to the plan in the PCR's (SNS 5MW system), a more aggressive and more costly plan is being developed. It uses a LANSCE Klystron and "White Horse" transmitter. The tube socket is compatible with the LANSCE klystron. For the modulator two options are being explored the ANL "CWDD" (which is missing some long lead items) and an SNS unit "Reece's Pieces" (which is not compatible with the Feb-02 goal).

A second-generation installation of a set of three SNS 550 kW klystrons is also being considered. This would accelerate by ~21 months the first system test of the LLRF (1-Jul-02 vs. 1-Apr-04).

The immediate approval of these PCR's or alternates is required to get people started working on this. The work-around costs continue to increase by one FPC pair every 2.5 weeks.

The CHL BOD has slipped 8 months; it is now after the last of the refrigeration equipment has been delivered. The installation, commissioning, and burn in schedule has been compressed by 4 months to recover half of this slip, but the sub-system acceptance test deadlines and most of the warranties will have expired. The A&E has supplied an RFE date 6 weeks before BOD, which matches the delivery date of the 4.5 K Coldbox. Discussions are continuing.

ASD/BNL: Ring

Bid packages for the 26Q40 quadrupole magnets have been received and are being reviewed prior to award. This is the second bid iteration. The low bid appears to be slightly higher than engineering estimates.

Dave Dale participated in a "PSSR" validation review with the SNS Project Office. BNL will look at options to release out-year phased procurements should additional funding become available.

Bob Lambiase and Jon Sandberg conducted an in-house design review of the medium range power supplies. Arrangements have been made with the SNS Project Office to conduct a final review of the design package, via a videoconference, later this week.

Our vendor has confirmed shipment of the first HEBT dipole vacuum chamber. This 6-meter long chamber left port from France 10 days ago and should arrive at BNL by mid June.

Allied Engineering has informed us that the production 1st article Ring dipole magnet core is being prepared for shipment to BNL. ETA is June 15.

The 21cm sextupole/octupole corrector magnet procurement packages are complete and being released for RFQ.

Lambiase, Nepsee, Oerter, Peng and Smith completed a first iteration of the Interface Control Document between the Ring and Transport Line Power Supply Systems and Integrated Control Systems.

Controls:

RTDL and event link encoder boards are available for labs to use in testing applications that require them. Arrangements are being made to ship one board to LANL to test the prototype utility board. Another board is being sent to LBNL to test receivers being built by the diagnostic group. Software sufficient to make the boards send data to decoder boards is also available.

Testing of Linux systems (a server and OPIs) at BNL is proceeding well. The only problem encountered so far is testing Capfast on the Linux server.

BNL received a second Power Supply Interface (PSI) board, which will allow them to test the Power Supply Controller board with dual PSI boards.

Preparations continued for sending an EPICS software development system to Sverdrup in Tullahoma, TN. A MEDM screen for de-ionized water system has been built and is being used for testing. A combination spreadsheet-and-Access-database tool for developing IOC databases has been tested and demonstrated to work. By the end of the week, an end-to-end test was performed. (i.e. We were able to develop a demo control system where we could change process variables in a PLC and watch the values change on a MEDM display).

A draft version of "ICS Network Management and Security Plan" was sent out for comments. A fairly complete plan is required for the ICS network final design review scheduled for this summer.

The Target 60% Title II drawing package was checked over in preparation for the design review next week.

ASD/ORNL: Integration

Populated the ASD electrical safety committee and convened first meeting

Populated the cryogenics safety committee in collaboration with XFD; first meeting scheduled for next week.

Accelerator Physics

Benchmarking of different linac particle tracking models through the SNS linac continued, resolving previously observed discrepancies.

The effect of misaligned SRF cavities on the beam emittance was investigated. Initial results show only a few percent emittance growth for cavity misalignments of up to ± 1 mm and ± 1 mrad.

A technical memo was written on timing results using the EPICS channel access synchronous get as a means for providing time correlated data for a limited set of process variables. Acceptable error rates were found for a few signals with collection rates of a few Hertz, but the method is dependent on the IOC load.

Operations

Ion Source Group

RF Group

The linac RF group has been working on plans to provide Jlab with a 1-MW RF system. David Anderson will be spending the next 2 months at LANL. Plans to RF testing in the Rats building are being finalized. Jlab people will be here next week to look over the CWDD power supply and to discuss coordination and effort. Hengjie Ma our LLRF engineer starts June 4th.

Cryo Transfer Line Group

Mechanical Group

Installation and RATS Building

Finished tray and light installation on the DTL tunnel mock-up. Received new duct bank layout for ring mock-up, changes will start next week.

Piping continues for the DI water headers, with the resin beds due in by early next week.

Preparations are being made to receive and store in RATS 118 barrels of Envirotemp oil for the RF Group.

Transmittals have been approved to standardize welding receptacles and to transfer the responsibility for Front End technical component electrical panel and cable tray design/installation to Conventional Facilities.

Efforts continued on scope transfer and hand off planning. During the next few months, cognizant Partner Lab and SNS engineers will develop the detailed hand-off plan for a particular system, develop associated cost estimates and acceptance criteria, and review these with SNS/Partner Lab management.

This weeks Installation meeting covered the RF test facility equipment installation.

Started work on sealing the openings on the CHL helium storage tanks on site in preparation to pressurize with argon.

Magnet Measurement Group

Drawings are out for quote for one support stand and a measurement coil for the HEBT dipoles.

Power has been connected to the CCL measurements stand.

We are also studying fields from rebar.

JG Wang is making field calculations in preparation for 12Q45 measurements and HEBT dipole measurements.

Power Supply Group

This week, a teleconference was held between the power supply groups at ORNL, BNL and LANL to determine if there was any commonality of future magnet power supply purchases. (Note: the low field magnet corrector power supplies, which comprise the majority of all dc power supplies at SNS, have a common vendor/specification). It was determined that there are no additional power supplies which are common to the LANL and BNL magnets. This is due to the differing current/voltage specifications and differing power supply current control tolerances between the ring and the linac. Also discussed were the current margins required and the spares policy. Current margin requirements, generally 10-20%, are to be set by the partner lab power supply groups, after consultation with the beam physics and magnet groups. Complete power supply spares are to be purchased at the 10% level (or at least 2) for smaller power supplies or where there are large numbers of power supplies of an identical type. For larger power supplies of a type where only a few are used, there will be a complete sparing of parts, including magnetics (transformers).

A draft Hazard Control Plan DC Power Supply Test Procedure has been written and is under review within the Ring Electrical Systems Group.

In the power supply test facility at RATS, instrumentation is being tested and ac power installed in preparation for corrector power supply tests (Fall 01).

Survey and Alignment Group

Beam Diagnostics Group

D-plate: Final design work continues.

BPMs: Testing of the PCI motherboard continues to produce excellent results. Two of the more critical portions have been successfully tested. These are the acquisition sequencer and the interrupt. The new DFE board design is send out for fabrication on 31/May/01. It should be back the week of June 4th. The AFE testing by Bergoz also continues to look good. The CCL BPM pickup drawings have been checked and revisions are now in progress.

Wire scanners: Fabrication estimates for the SCL prototype actuator are in progress with a local vendor. A new conflat flange mounting design is being detailed, and will be included as part of the prototype. We are in the process

of estimating the costs for LANL to deliver the HEBT, ring, and RTBT actuators in the event that this work is transferred from BNL to LANL.

PDRs: The WS PDR is tentatively scheduled for July 17th. The D-plate PDR is tentatively scheduled on the same day or the next day.

ORNL-SNS beam diagnostics progress report: Dave went with Jeff Patton to LANL for an EPICS/RDB meeting. The meeting was mostly about integrating Kay's EPICS tables into the RDB, but also included the equipment data tables for some of the things the Controls guys are involved in. Dave has identified the elements that can be directly used for diagnostics configuration and management. Tom and Saeed attended diagnostic meeting at BNL. They discussed the Loss monitor system design, schedule, and testing with Richard Witkover and Dave Gassner. Saeed spend a day going over the Laser wire and IPM design with R. Connolly. Plan is to test the Laser wire on the 200 MeV line. The new remote control Laser wire parts will be ordered soon. Tom raised the question of tune measurement devices required (Coherent tune and incoherent tune spectrum) with Hoffman and BNL staff. Saeed will investigate this further at PAC. The RHIC sequencer, time ADO, and correlated acquisition tools were investigated. Similar tools should be deployed on the SNS application server. Craig is charging a head with Faraday cup design and refining the possible collaboration with Marco Poggi et. al. at INFN-LNL.